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A STUDY OF AN EFFECTIVE OFFSETS MODEL FOR KOREA

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December 2013**

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A STUDY OF AN EFFECTIVE OFFSETS MODEL FOR KOREA

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requirements for the degree of

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ABSTRACT

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LIST OF ACRONYMS AND ABBREVIATIONS

ADD	Agency for Defense Development
BIS	Bureau of Industry and Security
BAE	British Aerospace Systems
CPA	Comprehensive Performance Analysis
EADS	European Aeronautic Defense and Space
EISD	Excess Inventory Sales Division
EU	European Union
FMS	Foreign Military Sale
ISDEFE	Ingenieria de Sistemas para la Defensa de Espana sa
KARI	Korea Aerospace Research Institute
KDAPA	Korean Defense Acquisition Program Administration
KDATQ	Korea Defense Agency for Technology and Quality
KIET	Korea Institute for Industrial Economics & Trade
KMD	Korea Ministry of Defense
KOTRA	Korea Trade Investment Promotion Agency
MOA	Memorandum of Agreement
NATO	North Atlantic Treaty Organization
RFP	Request for Proposal
SAAB	Svenska Aeroplan AktieBolag

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–Captain Kam, Mookun

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–Captain Kang, Hyungphil

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I. INTRODUCTION

A. PURPOSE

The purpose of this study is to promote an understanding of offsets, and present a new model for an efficient offsets process. In particular, the study focuses on how and why the new model has been developed for the offsets process. In addition, the study investigates the flow of international trade and explains the offsets position in Korea as it relates to international trade. Currently, the Korean Defense Acquisition Program Administration (KDAPA) is responsible for the offsets procedure, which has some advantages and disadvantages. Therefore, the new model can be used for alternative and future work to mitigate the disadvantages of the current method. Conventional offsets procedures will be analyzed on a step-by-step basis and this project will explain in detail the new model for the policy improvements.

B. BACKGROUND

After the Cold War, the United States led the World Trade Organization and France led the European Union (EU) in the competition that took place in the weapons market. European countries had developed military weapons through cooperative research and development. This arrangement posed a significant threat to the U.S. defense industry and its arms exports. Since the mid-1990s, the complicated background of the defense weapons business led to competition between contractors in the U.S. and the EU (Song, 2005).

Since 1983, offsets, which were organized by the KDAPA, have been implemented in Korea. According to the KDAPA regulations, offsets refer to the conditional trade in which military supplies are acquired from a contractor who is compensated with a counter-purchase, including technology transfer, manufacturing of parts, or export of parts. Offsets are classified into direct and indirect offsets programs. Offsets application criteria encompass overseas acquisition programs equal to or worth more than 10 million USD. If necessary, offsets may be applied to acquisition programs worth less than 10 million USD. The offsets obligation value ratio is more than 50% of

the estimated main contract amount. This ratio can be adjusted (increased or decreased) on a case-by-case basis (KDAPA, 2012). One purpose for using offsets is to obtain defense science and technology without transfer barriers between countries. Offsets offer a window through which to obtain a core technology owned by a foreign company.

C. PROJECT OBJECTS

The purpose of this study is to present a new offsets model that eliminates the unnecessary or inefficient procedures of the existing model. An overview of the study promotes understanding of a new model through the identification of problems in the current procedures. To build an efficient offsets process, the newly proposed model and policy options will be provided.

D. RESEARCH QUESTIONS

1. Main Question

The main question driving our study is, “How efficient is the existing offsets model, and how can the model be improved?”

2. Secondary Questions

To help us explore the existing model and develop a new one, we will consider these related questions:

- What is the history and current status of offsets? What forms and types of offsets exist?
- What are the rules and policies of the Korean government and the Korean Ministry of Defense related to offsets?
- What is the new proposed offsets model?
- What is the key difference between the existing procedure and the newly proposed one?

E. SCOPE

This project analyzes the value of offsets conducted in Korea from 1983 to 2012. In addition, the acquisition of military technology in the field of defense technology is investigated in detail. As the skill levels of many countries have improved, the technology gaps between these countries and developed countries have narrowed. Therefore, developed countries have begun to avoid the transfer of core defense technologies. This project tries to figure out how to overcome this situation and get more defense core technologies in the offsets process negotiation.

In addition, we focus on how to assess value systematically through the process of offsets. Accordingly, this project looks closely at defense offsets in the process of technology transfer. To improve the understanding of offsets issues and the future risk factors when managing the offsets system, we sought to develop the process. However, this project deals with only approximate methods for assessing value and covers present and previous studies.

F. METHODOGY

This thesis reviews the methodology of the relevant theses and government documents to propose a new Korean offsets model. The problems of the current processes are identified and investigated. Problems with the KDAPA regulations and policies will also be identified. The policies of the Korean government and the KDAPA will be included for conducting reliable research. To this end, information pertaining to the Korean Ministry of Defense (KMD) and its related Korean agencies, such as the Agency for Defense Development (ADD) and the Korea Defense Agency Technology and Quality (KDATQ) will be included in the project. In addition, other Korean government agencies, such as the Ministry of Knowledge, Economy, Small Business Administration, and the Korea Trade-Investment Promotion Agency (KOTRA) will be included in this study.

G. ORGANIZATION OF STUDY

Following this introduction, the thesis is organized into the following chapters: Chapter II includes an explanation of the history and background of offsets within an environment of international trade. The history of offsets in Korea, in particular, including the types and forms used will be discussed in detail. Moreover, we will provide a comprehensive definition of offsets and define key terms associated with offsets. In order to provide an overview of the current position of offsets in international trade, we will examine the data about the current status of Korean offsets.

Chapter III describes the offsets-related problems Korea is currently facing in trade procedures. A study of offsets in Korea has only recently been made. Pushing through the work, even in its brief history, the KDAPA has encountered many problems. These problems in the current the KDAPA model are analyzed in this chapter.

Chapter IV presents a proposed offsets procedure to solve the problems of the current model. The differences in the efficiency of existing procedures and the new proposed procedures will receive particular attention. Each step is described in detail to improve current policies and the process of offsets.

Chapter V summarizes the new offsets model for Korea. This chapter includes the conclusions drawn from various analyses. Lastly, the limitations of this study are acknowledged and suggestions for the future research are made.

II. OVERVIEW OF THE OFFSETS PROCESS IN KOREA

A. THE GENERAL CONCEPT AND DEFINITION OF OFFSETS

1. Definitions of the Offsets

a. Academic Definitions of Offsets

Many experts have already defined the concept of offsets academically, because the offsets model has been studied and developed over the past 50 years. For example, “an offset occurs when the supplier places work to an agreed value with firms in the buying country, over and above what it would have bought in the absence of the offsets” (Martin & Hartley, 1995).

According to Jurgen and Paul, “Offsets are simply goods and services which form elements of complex voluntary transactions negotiated between governments as purchasers and foreign suppliers” (Jurgen, 2004).

These same authors, however, do not always view offsets so simply. In another work on arms trade, they focus on the legal aspects. In this context, they maintain that “an offset is a contract imposing performance conditions on the seller of a good or service so that the purchasing government can recoup, or offset, some of its investment. In some way, reciprocity beyond that associated with the normal market exchange of goods and services is involved” (Jurgen, 2004).

Similarly, Stephen asserts, “Offsets, coproduction, barter, and countertrade are compensatory trade agreements—agreements that incorporate some method of reducing the amount of foreign exchange needed to buy a military item or some means of creating revenue to help pay for it” (Stephen, 1995). Offsets could be defined differently because the term applies to different countries in various ways; even its name varies. The definition of offsets also could be different depending on the expert or researcher who defines the offsets.

b. Working Definition

For the purposes of this project, we define offsets as contracts in which a buyer can be guaranteed to receive a trade offer. For example, if a country buys any weapons or equipment from outside by offsets, the country can receive foreign-related knowledge or skills from the other party to the contract. Weapons, equipment, or components, such as the export of certain conditions, are included in the trade offer.

According to the KDAPA policy, foreign purchase contracts valued at more than a \$10 million business unit should, in principle, be accompanied by offsets. For a sole source contract more than the offsets rate, 10% of the trade volume is applied, and more than the offsets rate of 50% is applied in the case of a competitive contract.

2. The Purpose and Characteristics of Offsets

a. The Purpose of Offsets

An offset is a part of defense business which is derived from overseas business improvement purchases. Offsets may need a long period of research and development and involve a significant amount of acquisition cost, but offsets are essential for major improvements in technology and the realization of self-defense. When it comes to defense purchases, the Korean military prefers overseas purchase business. Although domestic purchases offer a shorter acquisition period and the benefit of relatively low acquisition cost, their weak contribution for developing domestic defense technology puts the defense industry at a disadvantage.

Offsets could be a complement to the domestic purchase process by taking advantage of and overcoming the disadvantages of existing model. Within a short period of time, the offsets process can satisfy the demands of fighting power. Offsets also can be a possible way of acquiring advanced technology which will become the foundation of independent weapons system development in the future. This is the true purpose of offsets. With offsets we can aim at saving foreign currency, benefiting from the transfer of high technology, increasing exports, strengthening the military capability of support, participating in international co-development and co-production of research, and increasing investment in domestic industries.

b. The Characteristics of Offsets

The offsets process is conducted by Memorandum of Agreement (MOA) rather than a contract between the home country and a foreign company to pursue this country's general income and other economic profit. The offsets process has six characteristics as compared to counter-trade.

First, the offsets process is mainly used for military trade to buy high-priced defense articles rather than for private foreign trade. This means that offsets are usually called military offsets.

Second, the purpose of military offsets is more varied than that of normal trade. Normal trade pursues the international balance of payments, but the military offsets process is conducted for industry development, economic development, and political benefits.

Third, offsets involve various types of processes. Trade is normally promoted in a form of compensation trade, barter, counter-purchase, and industrial cooperation, but military offsets is promoted in a form of co-production, license production, subcontracting production, technology transfer, and foreign investment.

Fourth, exchange transactions do not occur in offsets. For private trade, traditional monetary calculation is used because there is a considerable time gap between import and export. However, military offsets rely on a Bank Guarantee or Corporate Guarantee to secure fulfillment of offsets.

Fifth, the offsets process does not require a written contract. For private trade, a contract document provides a guarantee that each party involved will perform its duty, but an MOA is enough for offsets. It means that the duty of giving return service is not a legally binding duty for the provider (Ha, 2004).

3. The Type of Offsets

The most common types of offsets are direct and indirect (see Figure 1). These categories apply for offsets in most countries, including the U.S., depending on the relationship with weapons systems.

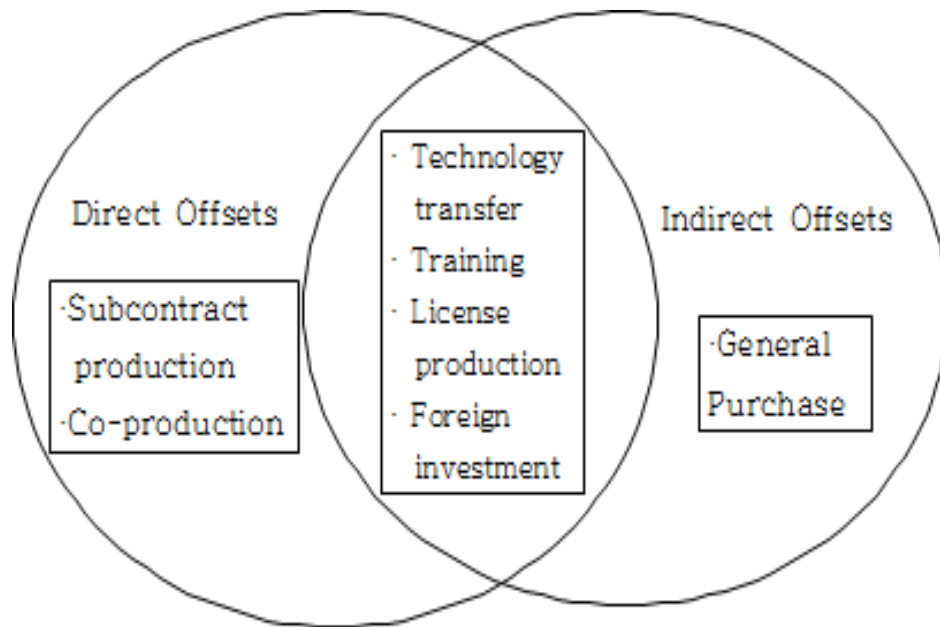


Figure 1. Type of Offsets (BIS, 2007)

Following are the specifics of offsets types, outsourcing production, co-production, technology transfer, training, license production, and foreign investment as well as regular purchases (BIS, 2007). The division of direct and indirect offsets depends on its relevance to the weapons system acquisition project and its purchase material. Direct offsets involve the direct acquisition of technology which is related to the weapons system of the main contract purchase project. Indirect offsets involve the purchase of similar or other weapons system equipment and technology which is not related to the main contract purchase project.

Subcontracting, joint, and license production mean that suppliers are buying components or other products from the importing country by additional contract. General Purchase, by contrast, is a deal that does not target weapons systems but general material.

B. A BRIEF HISTORY OF OFFSETS

1. The Origins of Offsets

After WWII, the U.S. assisted Western Europe financially and materially at no cost to protect them from the threat of Communism, but the U.S. government put pressure on each country to buy weapons to recover a balance of payments deficit. This is the origin of offsets. For the first time, the offsets process was used in Germany. The U.S. government forced Germany to buy U.S. weapons in exchange for U.S. troops in Germany to reduce a growing balance of payments deficit in 1961 (Office of Management and Budget, 2011, pp. 8–15).

After that, the U.S. changed its policy of providing military equipment to the UK, France, and Germany from free of charge to for a fee, while they provided offsets to Western European countries to support reconstruction of NATO allies and to enhance national security by improving diplomatic and military ties with other countries.

After 1960, Western European countries accumulated aviation defense technology by using cooperative development and component manufacturing offsets when they bought aircraft from the U.S. For European countries, offsets was an additional practice condition for dealing with the U.S., but that practice became a pre-requisite because most countries required some benefit in return. Today, the need for offsets is increasing.

From 1976 to 1980, several disadvantages arose from co-production, so most European countries required offsets to develop their own weapons system. The U.S. government faced several requirements from customers, and it realized the necessity of technology protection. For this reason, there was a change in the weapons purchase system. The U.S. government gave positive aid to Europe to participate in the development of weapons and license production. The Soviet Union did as well with its allies. At the time, offsets were focused on research and development (R&D), technology transfer, buy-back, and cooperative development between the U.S. and Europe.

After 1980, most developing countries proposed offsets as a compulsory condition to build their own defense industry. Moreover, the worldwide economic recession made suppliers allow a greater number of offsets and offsets became a common economic matter. Especially, European countries started joining with suppliers based on acquired technology by license production and co-production. Industrial-based countries manufactured weapons systems to sell them using a broker country, which acted like a black market. As a result, the increase of the supplier-made weapons market became fiercely competitive, and there was a greater tendency to using offsets in bargaining. Most countries tried to use offsets as a way of saving foreign currency, improving export, and transferring high-technology products. It became a standard practice in the international weapons market.

Since the Gulf War, however, sellers have begun reinforcing regulations as a national policy and law to protect their defense technology. Also, the buyer's need for technology transfer for self-defense is increasing. So, nowadays, offsets is a considerably more complicated and delicate way of trade, which presents difficulties for sellers and buyers.

2. History of Korean Offsets

Before 1970 there was no recognition of offsets, because the Korean government did not need to buy high-priced defense articles. However, owing to the reduction of U.S. forces in Korea and the increasing necessity for independent defense, the Korean government has been compelled to purchase expensive defense articles since the 1980s. The KMD adopted offsets for the first time to promote an aviation industry when they bought the F-16 aircraft from General Dynamics in 1983.

During the 1980s, the Korean government recognized offsets as an important policy for the defense industry and economic development. It realized that it needed to develop an offsets strategy and policy, so offsets executives visited England, Australia, and Taiwan to research offsets cases and establish an offsets development plan. The Korean government tried to export domestic products preferentially. Initially, the offsets

ratio was 50% of the contracted price. At that time, Korea mainly exported automobiles, textile products, and machinery.

Beginning in 1990, the KMD initiated a policy to acquire defense core technology to develop independent weapons systems and components. They focused on getting technical data packages related to system design, manufacture and production, test and evaluation, and technical training for this purpose. This initiative contributed to the development of the technical skills of the Agency for Defense Development (ADD) and defense industry enterprises. At the same time, the offsets ratio was decreased to more than 30% of the contracted price, because the initial compulsory ratio was too high to keep applying offsets with developed countries. The KMD achieved a number of visible outcomes at this time, such as participation in the co-production of T-50 training aircraft at the level of exploratory development.

In the new century, the KMD has continued to focus on acquiring core technology and has tried to export more components and sub-systems which were developed by that core technology. It has enabled Korea obtain many orders such as production of the F-15k fuselage and depot maintenance of Utility Helicopter, UH-1H, and Cargo Helicopter, CH-46, among others. These orders have also contributed to the progress of the technical skill of Korean defense industry enterprises. After the establishment of the KDAPA in 2006, they made some improvements. The KDAPA diversified various types of offsets, including Foreign Direct Investment to offsets and an increased offsets ratio of over 50%. The newly-organized Offsets Department has handled everything that has to do with offsets (Jang, 2012).

C. PRINCIPLES AND STRATEGY OF OFFSETS IN KOREA

1. Principles

Offsets work of the KDAPA is clearly specified in the Defense Acquisition Program Act and its implementing ordinances. The KDAPA has also made a guidebook for practical use. According to the Defense Acquisition Program Act, offsets should be applied to overseas purchase projects which are over \$10 million. The offsets ratio for a

sole source project is 10% and 50% for a competitive project. The recognition range of offsets negotiation is as defined in Figure 2.

- Securement of defense science technology
- Production and export of weapons system components
- Securement of logistics support related matters for weapon system
- Performance improvement of existing equipment
- Military supplies export (including developed product for export)
- Foreign maintenance quantity securement
- Joint participation of main development project
- Anything related to defense capacity improvement and also can contribute to national interest
- Connection export of defense offsets recommended item
- Attraction of foreign capital

Figure 2. Recognition Range of Offsets Negotiation (from Kang, 2009)

The order of priority during negotiation and classification should be decided according to the criteria for each class, as shown in Figure 3.

- A Class: weapons system core technology, participation in acquired weapons system production and manufactured component export, export of military supplies, participation in cooperative research development
- B Class: performance improvement of existing equipment, depot maintenance requirement, acquisition of quality guarantee related matters
- C Class: logistics support elements acquisition, export of defense offsets recommended item, attraction of foreign capital
- D Class: general defense technology acquisition, foreign maintenance quantity securement
- E Class : anything related to defense capacity improvement and also can contribute to national interest

Figure 3. Offsets Classification Categories (from DAPA, 2013)

2. Offsets Strategy of Korean Government

Korea is now in the development stage of offsets. Its goal is to get a core technology to develop defense science technology and export components to promote the defense industry. The Korean government can limit the range of offsets to the defense part and acquire necessary technology, because the scale of the Korean weapons market is big enough and Korea is internationally recognized as having a relatively superb defense science technology.

In the matrix shown in Figure 4, “Push type” represents a foreign company that discovers a technology for offsets and suggests it to the customer. The “Pull type” represents the customer that chooses the necessary technology and requests it from a foreign company. The “Organized type” is when offsets participating establishments and companies are connected variously and complexly, so offsets may progress by organized procedures and regulations, and is strategically executed to maximize the outcome when there is sufficient time. The “Practical type” is executed rapidly by the government’s lead for a limited time. The Korean government started with the Practical Push Strategy which only needed a low level of technical skill and a low scale of weapons import, but now the KDAPA is applying the Organized Pull Strategy to get as much technology as possible.

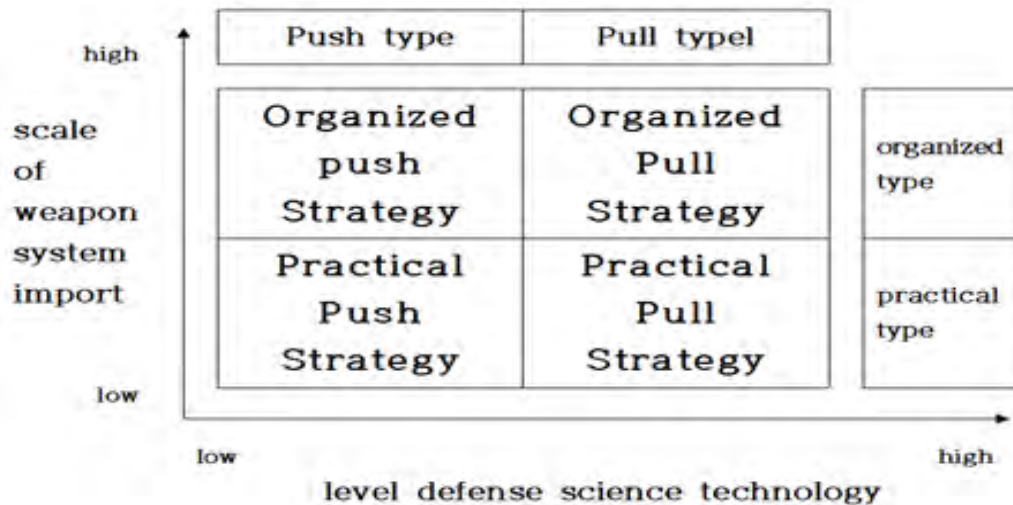


Figure 4. Offsets Promotion Strategy (from Lee & Jung, 2009).

D. PERFORMANCE OF OFFSETS

Since the Korean government adopted offsets for the first time in 1983, they have applied offsets to 504 projects and contracted \$34 billion. The value of \$14.6 billion was created through offsets during the past almost 30 years as shown in Figure 5.

	Number of offsets applied project	Sum of basic contract (\$ million)	Value of offsets (\$ million)	Ratio of offsets per basic contract	Direct/ indirect ratio
1983–2010	504	34,012	14,644	43%	direct : 70 indirect : 30

Figure 5. Integration of Offsets Performance (From Jang, 2012).

The ratio of offsets against the sum of the basic contracts is 43% for the last 30 years. This is relatively lower than the average ratio of U.S. offsets for the last 16 years, which is 70%, and for Europe, 100%. Initially, Korea started offsets with a higher ratio, almost 50%, but after the 1990s it was decreased to 30%. This reduction was due to external pressure from the sellers. However, the KDAPA increased it to 50% in 2009 to catch up with the global trend.

Not only developed countries in Europe but also many Asian and African countries have adopted offsets and expanded the offsets ratio. In particular, the more developed the country, the higher the offsets ratio they have. Other countries, except for European countries, are also increasing their offsets ratio rapidly. However, there is considerable argument about the outcome of offsets as a result.

1. Advantages of Offsets

a. *Saving Foreign Currency*

From 1983 to 2010, Korea exported \$14.6 billion through offsets, which is considerable foreign currency savings. Korea enjoyed many benefits from the program, such as equipment investment and creation of employment.

b. Technology Acquiring Effect

Korea has acquired military technology, which is hard to get by general trade, and has utilized this technology for weapons system development, performance improvement, as well as maintenance and technology development for weapons production. Especially, since 1991 the Korean government has put first priority on acquiring technology. Of course, there have been many successful cases of acquisition, but doubts about the value and utility of these technologies have arisen.

2. Disadvantages of Offsets

a. Impediment to Market Efficiency

In some sense, offsets can hinder market efficiency when it is promoted as a privilege for a limited number of countries and companies. But, it depends on each country's situation and condition. Many countries utilize various methods, including offsets, to protect not only the domestic defense industry but also particular private industries. From the perspective of Korea, which is now promoting automation of the defense industry as a point of national security and economy, market inefficiency owing to offsets is not a great concern for judging market efficiency.

b. Probability of Rising Contract Prices

The price of a weapons system should not be related to offsets. However, people inside and outside of Korea have argued that offsets makes the price of weapons increase. This opinion is persuasive because real expense is incurred when a foreign weapons system seller provides offsets to a buyer. Korea has tried to prevent offsets from becoming a factor of increasing price, nevertheless offsets hands-on workers and defense industry company staff usually say that offsets makes weapons system prices rise by 10% above the original price.

E. THE PROCESS OF OFFSETS

The KDAPA plays an important role in Korea's offsets procedure. A lot of domestic defense-related research institutions and defense contractors participate to promote fair and effective business procedures and practices. The offsets procedure

consists of the following phases: Policy, Planning, Negotiation, Management of Implementation, Management of Asset, and Export Company Offsets. An overview of these phases and their associated tasks is shown in Figure 6.

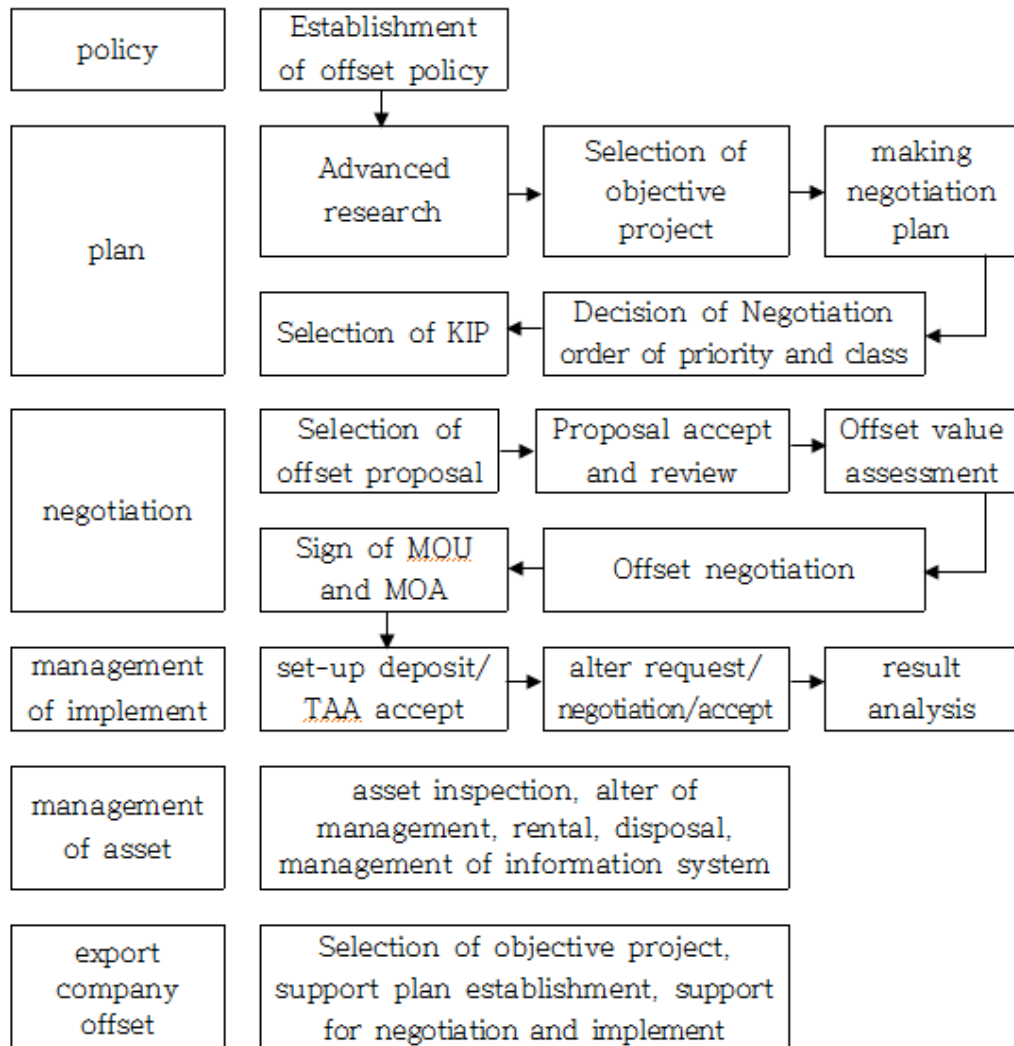


Figure 6. Korean Offsets Task Execution Procedure (from DAPA, 2011).

During the planning stage, according to pre-research per project, promotion of offsets and applied percentage is determined. The offsets percentage can be adjusted by the characteristics of the project, technical status of the objective company, and investment costs of the project. Following that phase, the negotiation plan is made and reviewed. Finally, the order of priority and rank is decided.

During the negotiation stage, the KDAPA requests a Request for Proposal from companies and implements the technology value assessment for each negotiation option. Signing a Memorandum of Understanding through negotiation is based on the technology value assessment. After signing the contract, a Memorandum of Agreement and a Technical Assistance Agreement are required to perform management of implementation. The result of offsets implementation must be made and submitted.

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III. ACTUAL SITUATION AND PROBLEMS OF OFFSETS PER PHASE

A. RECOGNITION PHASE

1. Current Conditions

During the Recognition phase, the Korean government assesses what has become an advantage to Korea. The main business activities of this phase are the creation of a request for proposal (RFP) and negotiation of proposal development. Currently, this phase is accomplished by an integrated business management team of the KDAPA, which oversees the weapons system acquisition. The KDAPA organizes and derives the necessary technology to approach an outside contractor. They request more necessary information about the technology from companies and trade negotiation with participating institutions. Then, the companies and institutions create a trade negotiation proposal. Later, the integrated business management team creates an RFP, which is based on the final negotiation proposal that has been accepted from the different agencies, and sends the RFP to foreign manufacturers. The key here is how to develop a negotiation plan by carefully discovering and organizing the necessary technology for the development of the national defense science and technology of Korea.

2. Problems of the Recognition Phase

Korea needs to put the highest priority on export rather than securing advanced technology. According to Article 13 (trade negotiations draft formulation) of the offsets guidelines (2012), the highest current priority, when they do offsets, is to secure core technology in conjunction with the execution plan for the Defense Science and Technology Agency. The second highest priority is to ensure secure technology required for the development of key components, authentication, and related technologies for evaluation of weapons systems, facilities, and equipment. Currently, the export and manufacture of related parts of the apparatus is ranked fourth, which is too low of a priority to enable export.

However, there is a limit to the discovery of technology needed for the development of national defense science and technology. To acquire technology that prevents “technology leakage” in developed countries is a situation that is getting more difficult every day. Therefore, exploring another direction that can export directly, such as joint development or co-production, will be more beneficial to Korea.

According to the Bureau of Industry and Security (BIS, 2012), an annual report of trade negotiations published in the U.S., technology transfer is ranked only third, following the subcontract production and purchase (U.S. Department of Commerce Bureau of Industry and Security, 2013). It means that most of the purchasing countries have shifted the strategy of technology transfer from acquisition-oriented to export-oriented for job creation and enhancing competitiveness in the defense industry. Most developed countries participating in offsets are promoting strategic offsets and co-production, but Korea’s portion of technology acquisition in offsets is still less than 50%. However, technology transfer is much more limited than in the past because of the increased trend in protection of intellectual property rights. That is why developed countries in offsets have shifted the direction to subcontract production and purchase (KDAPA official blog, 2013).

In the case of Korea, offsets have been carried out to ensure the availability of important technology until recently. Nevertheless, the utilization of technology which is obtained by offsets is very limited because of the particular regulations that are applied to technology transactions. Therefore, putting highest priority on the acquisition of technology is not preferable in offsets since the defense industry of Korea could be tied to technology owned by other developed countries indefinitely. Also, Korea might not be able to develop weapons systems with their own technology in a short period of time (Yang, You, et al., 2012).

B. ACQUISITION PHASE

1. Current Conditions

Foreign companies and their customers mutually agree to acquire and provide technology in the acquisition phase. Korea will endeavor to adhere as much as possible to the quantitative and qualitative requirements of each military service. The main business of the activities of this phase includes an assessment of the technology which foreign companies have decided to offer and negotiation with these companies about the value of that technology.

An assessment of fair market value is essential, but it could be very subjective. Evaluation of the monetary value of these technologies is difficult even though there is a standard, because the present value is likely to differ in the future. Measuring the current value is relatively simple, but future value may differ depending on the foreign company and its criteria. Therefore, much effort is required to evaluate these values exactly. Correct assessment should be executed before the negotiation with foreign manufacturers.

2. Problems of the Acquisition Phase

Korea has not been maximizing the offsets gains using its bargaining power because of insufficient strategic integration and cooperation between the offsets process and purchasing operations. There are several reasons why the fundamental bargaining power of Korea is weak, even though Korea is one of the biggest buyers in the world (Lee, 2004).

The first reason is that the KDAPA does not employ economies of scale effectively in trade negotiations because it negotiates offsets by the unit. Second, the KDAPA has been unable to exploit its time advantage. That is, the Korean government has not given full play to the flexibility of the forces of time. Third, overseas manufacturers provide a negotiating proposal that has a lower priority and lower value because the KDAPA does not propose prerequisites that emphasize their priority in negotiation (Jang, 2012).

C. TRANSFER / IMPLEMENTATION PHASE

1. Current Conditions

Transfer of technology takes place in this phase of offsets, and there are many methods of offsets implementation, such as foreign technology training, domestic technical support, and provision of technical information. Therefore, it is important to determine how to be efficient in the transfer and implementation. The KDAPA has tried to obtain the necessary training, documentation, and other support to use the technology effectively. To acquire beneficial offsets technology, the government has made a technology transfer target list, as shown in Figure 7.

2013 Technology Transfer Target List				
Year	Number	Management Number	The name of the technology	Sector
2013	1	2013-1	Delicate fire power with array antenna and active phased array radar	Fire control
2013	2	2013-2	Fast ammunition system and calibration method	Ammo
2013	3	2013-3	New maneuver phased using data acquisition phase	Maneuver
2013	4	2013-4	Checking the signal itself as a high-frequency signal splitter	...
2013	5	2013-5	Pulse compression device	...

Figure 7. 2013 Technology Transfer Target List (from KDAPA, 2013).

2. Problems of the Transfer/Implementation Phase

Currently, the problem of the transfer phase is the lack of an introduction system which would induce foreign companies to transfer technology to Korean companies. The KDAPA does not have a quality assurance process that compares the technology that has been transferred. Moreover, there is no actual method of sanctions against a foreign company that has performed in bad faith. Many problems occur because a few foreign companies intentionally delay, or they do not fully implement, according to what was agreed upon in the contract. In some cases, items promised in the contract are replaced by some others of lesser value to meet the demand. According to the MOU, ownership of

technical data belongs to Korea but the transfer of ownership to a Korean company by foreign companies is rarely recognized. In addition, the problem of the level of technical education, the lack of performance, and insufficient coordination makes this phase difficult.

As an example, when the F-15K of Boeing was determined as the next fighter for the Korean F-X program, the original contract was not investigated properly. The value of offsets was reduced to \$600 million, although it was supposed to have been a value of \$1 billion. The offsets, even as they were reduced, also failed to meet the terms and conditions of the contract. Especially, the effectiveness of the offsets was reduced to half of the original value, because Boeing suggested offering a part with low technology transfer and excluding the original part, which was the main objective of the offsets (Kwon, 2012).

No matter how good the signed contract is, it may be completely meaningless if it is not properly managed. There must be a method to enforce the fulfillment of the obligation to the seller as agreed in the contract. For example, the KDAPA has managed by forfeiting the deposit in the case of failure of the contractor to perform. In addition, limiting the bidding eligibility on future business is one method for management. Usually, provisions are difficult to enforce because of the characteristics of the exclusive property of arms trade.

Foreign manufacturers participate in the bid to clinch the contract, even when the proposal has low feasibility of being successfully completed. For the customer, unbelievable conditions seem more beneficial and more attractive. The customer (the government) also wants to hear from the media that they have made a good contract. That's why an unrealizable agreement can be made by foreign companies and customers. This issue that foreign companies do not implement correctly is typically revealed over time. Both buyers and sellers are responsible for this problem (Lee, 2010).

Furthermore, a foreign company may fail to implement the terms of the contract because of financial loss. In some cases, foreign companies may change or try to change conditions after signing the contract. They do not implement the same agreement. The

cause of the problem would be due to the foreign manufacturer, but the KDAPA also bears responsibility for not managing the agreement effectively.

Thus, there are several problems related to the implementation of export. If the KDAPA penalizes foreign companies, it would cause excessive paperwork and inefficient management of implementation. Therefore, improvements for the more efficient implementation of offsets policies are required.

D. UTILIZATION PHASE

1. Current Conditions

The utilization phase creates the outcome by utilizing the actual technology which has been acquired by companies. The key point of this step is maximizing the benefit of offsets by using core technology and export volume that have been acquired by offsets. For this reason, the KDAPA investigates outcomes analytically and estimates their effectiveness.

When the KDAPA executes the performance investigation, it defines the concept of performance and performance management. After that, performance evaluation is performed in order to maximize offsets performance. The evaluation results are used when the KDAPA decides the incentive level for Korean companies. Next, the KDAPA prepares to incentivize Korean companies and foreign companies. There are two forms of incentives: direct and indirect incentives. The direct incentive is money or other bonus when the company achieves excellent performance. Indirect incentive can take the form of additional points or priority when the company participates in bidding and requests information. Foreign companies also get incentives when they transfer technology completely (Jung, 2009).

2. Problems of the Utilization Phase

The main activities of this phase are generating analytical reports and outcome reports, which are created after the end of technology transfer by the domestic offsets agency and companies. Outcome implementation performance reports are used to confirm whether the contracts have been implemented according to the agreement, and

implementation analysis reports are used to verify the specific outcome of acquired technology. But, despite these steps to confirm the properties, these reports currently look at performance achievements and are constructed to describe only general content without deep analysis. It is, therefore, inappropriate to analyze and affirm the achievements of the use of specific trade negotiations for acquisition of technology. Core technology acquisition to strengthen defense and enhance the defense industry is given the most weight in offsets negotiation priority, but the final level of utilization is evaluated too low. This is because analysis of substantial results through the follow-up evaluation of offsets negotiation is not thorough. Effective and practical tracking analysis is not performed on the utilization of acquired technology after the end of implementation. The offsets implementation agency in Korea creates analysis of the performance only once, after the end of the business transaction. In contrast, the U.S. issues comprehensive outcome reports of offsets every year (Lee & Jung, 2009).

The KDAPA has focused on performance investigation and evaluation in order to take advantage of the export volume obtained by offsets. After investigating and evaluating the performance, the KDAPA makes performance reports of Korean companies to determine the success or deficiency of export volume, and the companies report their export results yearly. Additionally, the KDAPA receives these companies' financial statements and reports of how many parts were exported. Therefore, the KDAPA spends much time evaluating and investigating the export results. The performance investigation is intended to ensure that the financial statements have been created correctly (Jung, 2009). However, this kind of reporting seems to be very burdensome and invasive. This kind of reporting and recordkeeping should be discouraged, because it requires significant work and uses energy that should be expended in competing for business.

E. DIFFUSION PHASE

1. Current Conditions

In this phase, the domestic defense-related agency and companies transfer or share the technology which they obtained from participating in offsets with the whole of

Korea, other agencies, or another companies. Formally, the business of distributing technology that has been acquired by offsets is specified in the relevant provisions of offsets program guidelines, so diffusion of technology is legal and possible in Korea. However, it is difficult to transfer or share with the civilian sectors; nevertheless, the Korean government still pursues this avenue to introduce defense technology into the commercial sector.

2013 Technology Transfer Target List				
Year	Number	Management Number	The name of the technology	Sector
2013	1	2013-1	Delicate fire power with array antenna and active phased array radar	Fire control
2013	2	2013-2	Fast ammunition system and calibration method	Ammo
2013	3	2013-3	New maneuver phased using data acquisition phase	Maneuver
2013	4	2013-4	Checking the signal itself as a high-frequency signal splitter	...
2013	5	2013-5	Pulse compression device	...

Figure 8. 2013 Technology Transfer Target List (from KDAPA, 2013).

The Korean government thinks that the defense technology can help develop the private industrial sector and create new sources of profit. For example, defense technology can offer technology of high-performance bearing material for aircraft manufacturers or machinery companies. In addition, private companies can use a defense ball-and-socket technology and direction conversion device for missiles. By utilizing the ultrasonic sensor technology of torpedoes, the conventional size and weight of civilian goods can be reduced. Other military technologies related to the environment or medical technology can be transferred to their related sector, such as the environmental and medical sectors (ADD, 2013). Furthermore, the Korean government announced the future development of technology for commercial use that has been acquired from defense technology.

Defense Technology	Future Creation Technology
Various unmanned weapons systems technology Ubiquitous sensor network technology	State-of-the-art intelligent robot technology Future residential space technology
Real-time command, control and communications technology Future exercises war simulation technology	New transportation technology Ubiquitous computing technology
Individual soldier's portable energy-harvesting technology Battle of hybrid vehicle technology	Renewable energy technologies Greenhouse gas reduction technology
Cognitive biological signals Intelligent autonomous robotics decision	Restore physical function skills Treatment technologies swine plague
NBC detection sensor technology Battlefield surveillance sensor network technology	Disaster and terrorism response technology Blocking harmful substances managed system

Figure 9. Future Creation Technology (from KDAPA, 2013).

The Korean government also expects to acquire defense technology from offsets. The government insists that the launch of NARO (the first indigenous Korean satellite) was the result of “spin-off” from the Korean government. The satellite relied on defense capabilities such as the many parts used in the assembly of the projectile, propellant systems, and inertial navigation guidance system. Many defense industry companies took part in the production of NARO (KARI, 2013). However, it was the result of investment in defense technology in the space and aviation industry, which is a strategic industry of the future.

2. Problems of the Diffusion Phase

This phase is not working properly, because the policies and procedures currently are not tailored to it. The KDAPA has only been checking the diffusion plan reports. They have not focused on the diffusion phase for development of civil technology. In addition, the ADD and the KDATQ, as research and development institutions, should

lead the diffusion of technology. However, the KDATQ has more interest in acquisition of technology than in the diffusion of technology. The KDATQ is usually impassive about diffusing technology. The KDAPA and KDATQ have not played a strong role in the diffusion of necessary technology because of lack of motivation.

Another problem in this phase is the absence of a “top-down” approach to identify technology. This problem is associated with the first phase; that is, identification of technology that is worth spreading does not occur. The technology has been mainly identified by the ADD, which has much scientific experience related to technology development. However, the ADD does not want to try to find worthwhile technology because it is very hard and time consuming work. Even worse, the KDAPA does not feel responsible for the technology identification and diffusion process. The “bottom-up” approach is also insufficient because it focuses on specific demands for technology by a company without a long-term roadmap for the KMD (Kim, 2012). Until now, the KDTAQ played a central role in promoting the distribution and activation of offsets technology information. The KDTAQ gathered the data from each organization because institutional technology data is scattered. It was difficult to collect all technologies continuously because they had few human and IT resources. The KDTAQ had problems with the ownership of technologies and establishing an automated platform for distribution and the smooth sharing of information (Han, 2012). It was not necessary for this to be a Ministry of Defense database, except for licensing the technology. The KDAPA did not think about the original foreign owner’s side. The owners did not want to share their technology that they owned. Korean companies that have limited rights to the technology also do not want to share their technology with others or grant someone else access to it. The Korean companies may see their technology advantage evaporate as it is made accessible to others (Cho, 2004). In the next chapter, we explore solutions to many of the problems identified in the previous paragraphs.

IV. SOLUTIONS

A. RECOGNITION PHASE

From the recognition phase, offsets should focus on export, not technology. If the KDAPA decides to do offsets in an overseas purchase project, usually the agency and company prepare the negotiation plan. The KDAPA reviews the offsets negotiation plan and establishes an integrated negotiation plan. During this process, the KDAPA needs to decide between the value-oriented offsets and the export-oriented offsets. The KDAPA should analyze whether the technology is necessary and whether they can acquire the technology practically. The KDAPA should pursue the export-oriented offsets, if the result of the analysis is negative. Korea has been conducting offsets focused on acquiring technology, but recently, the effectiveness of advanced technology is decreasing. At this point in time, export-oriented offsets are more desirable, and there are three options for Korea to get the benefit from offsets. The first option is to set an offsets ratio to 0% with consultation between the two countries, if Korea cannot get any value through offsets. The second option focuses on co-production during negotiation. The third plan is setting up an objective to increase export components. These options are detailed in the following sections.

1. Setting the Offsets Ratio

As mentioned previously, the first option for getting the most benefit from offsets is to set an offsets ratio of 0 to 10%. This plan is useful when the technology value is worth little or the seller does not want to transfer technology. Reducing the offsets ratio during negotiation can save defense budget. This option is more useful when Korea is sure that the effectiveness of the offsets import amount is not higher than the effectiveness Korea can get from the offsets export amount. The higher the offsets ratio is the more money is needed. Korea can utilize this approach inversely so as to save defense budget by reducing the offsets ratio. It means that Korea also does not need to carry out the seller's duty of contract.

Offsets can be seen as a kind of trade barrier in the government defense procurement market theoretically similar to the concept of a Free Trade Agreement. Thus, it could remit or lighten the offsets duty of the trade country during military trade between the two countries. It is possible that Korea might expand the basis of cooperation with main defense trade countries. Korea should consider applying a certain level of offsets ratio to valuable countries when there is a mutual reciprocity.

Even if there is doubt about the effectiveness of this approach, at least Korea can share knowledge with the trade partner, and can expect more than a visible effect. Communication and making agreements between two countries makes a relationship closer. As time goes by, initially inadequate rules and agreements could be improved. Perfect ease in the negotiation of offsets might be difficult, but Korea can establish a base for communication and mutual interest if it approaches trade partners diplomatically. Finally, the KDAPA can create a rule that the offsets ratio of certain projects could be set to 0% when the KDAPA decides it is a negotiation priority.

2. Focusing on Co-production

The second option for getting the most benefit from offsets is focusing on co-production during negotiation. This approach puts an emphasis on increasing exports rather than acquiring technology. Korea still has poor technology in certain crucial areas. The Korean defense industry enterprises still have low technical skills compared with other companies in the world market. So, Korea needs to consider the visible outcome made from offsets.

If the KDAPA says that it would not acquire technology by offsets, public opinion is going to be against the KDAPA. Koreans prefer to acquire technology regardless of national profit. Koreans do not know about the ineffectiveness of acquiring technology, because acquiring technology sounds appealing. They just have vague and optimistic expectations about acquiring technology. But, in the real world, there is no country that is likely to be willing to give away technology to Korea. Co-production is a more likely outcome and could be a good alternative for Korea. Moreover, Korea needs to promote

policies for securing medium- and long-term export amounts by co-development of weapons systems and production.

Presently, the trend in the development of weapon systems all over the world is not individual development, but co-development and co-production to save budget and use jointly. Korea also should follow these trends so as not to lose a clear benefit. Co-production is beneficial for the Korean F-X project because co-production gives profit to the foreign company as well as the buyer. If Korea adopts a co-production approach for a weapons systems development project which is in progress now, the government can save significant development budget directly (Jang, Kim & Su, 2012).

As of June 2013, Korea is progressing with its \$8.3 billion F-X project, which is adopting the next-generation fighter; the F-35A from Lockheed Martin, F-15SE from Boeing, and Eurofighter from the European Aeronautic Defense and Space Company N.V. (EADS) were all candidates. All three companies proposed offsets as a negotiation plan. They made a special consideration for technology transfer and domestic assembly production, if their fighter were chosen. EADS initially said that it would co-produce 48 fighters among 60 in Korea, but at the last moment of negotiation, they changed the number of co-production airplanes from 48 to 53. EADS suggested a considerable level of technology transfer, including aero-electronic software source code, components purchases, and logistics supply. When EADS recognized its lack of competitiveness compared with the competitors, it promised an increase of co-production (Hwang, 2013). This offer was made because Boeing had suggested an offsets program which provided an opportunity of more than \$1.2 billion in parts production. Thus, if the KDAPA proceeds with offsets in the F-X project focusing on co-production during negotiations with foreign companies, the KDAPA could get more benefit than it would by focusing on solely acquiring technology.

3. Focusing on Components Export

Finally, the third option is setting up an objective to increase export components. When a customer compares foreign companies, they put more weight on the company that is willing to import the customer's component as an offset to expand the domestic

components export volume. A foreign company that would import components can carry more weight in competition. Every company tries to have leverage by accepting components import, so the customer can expand its components export volume. But, according to offsets guidelines, Korea puts a relatively low value multiplier on components export volume. So, the present rule should be revised to give a higher incentive to companies that provide export volume to promote the export of defense articles practically by offsets (Kim, 2009).

The objective of the value multiplier needs to be classified by system, sub-system and components to give a different additional point. The value multiplier should be different depending on whether this is a first-time or subsequent export of components. The former has the effect of transferring new technology. Moreover, the value multiplier could be raised if new export volume gives positive effect to other industries as well. Thus, it gives motivation to foreign companies to supply newer components export volume. It also makes better circumstances for Korean companies to advance in the world market. As a result, Korea can take advantage from the foreign company's intention to get points by promising export of the same product and consider growth of export volume when they give a value multiplier.

B. ACQUISITION STAGE

1. Utilization of Time in Negotiation

Bargaining power is the most important factor in increasing export volume and evaluation. It is too late to evaluate the export possibility after getting the proposal from a foreign company. Adding conative negotiation is essential to raise the export possibility. In other words, bargaining power is the key to expanding export. Using the advantage of time is a good method to raise bargaining power. While negotiating, a party who does not have enough time usually cannot obtain a desirable result. A person who is pressed for time wants to conclude quickly, because he usually gives up more the longer the negotiation continues. If the other party knows this weakness, the problem grows worse. In the worst case, the profit which could be obtained from negotiation should not be given up.

Offsets trade negotiation is no different. A party who has plenty of time to negotiate has an advantage. If Korea has to buy certain weapons by tomorrow, it has no choice but to buy whatever weapon is available at whatever price is requested. In contrast, if a foreign company needs cash in hurry, Korea can buy that same weapon from the foreign company at a much lower price. Korea cannot utilize bargaining power in offsets because of the current disposition of time and lack of flexibility. However, foreign companies that have much experience in the weapons purchase business will delay offsets negotiation as much as possible to obtain an advantage.

Conative preparation in advance is necessary to maximize profit. The KDAPA should make, review and approve an export vitalization plan to utilize as a precondition of weapons purchase before a foreign company suggests offsets. By doing that, the KDAPA can pre-decide on a negotiation plan and announce it on-line and hold an annual presentation of the offsets negotiation plan to acquire a high-priority for negotiation. It will be emphasized that there must be a conative and continuous plan for expanding export around negotiation. This approach is different from past plans which assessed a company's proposal. In this new approach, the KDAPA, rather than a foreign company, proposes and evaluates the profit of export based on the KDATQ's assessment of the technology.

Before assessment, the KDAPA should make a favorable environment for a foreign company to propose offsets by holding an annual presentation and giving them a detailed explanation about component export. The advantage to this strategy in negotiation for components export along with export expansion and assessment can resolve one of Korea's problems in offsets, the time advantage. It will contribute to increasing the effectiveness of offsets by securing high-priority negotiation plans from foreign companies.

2. Realization of Economies of Scale

Economies of scale are another way of raising bargaining power in offsets. Korea made \$890 million from arms import contracts in 2010. In 38% of all contracts, offsets were adopted. Offsets-adopted contracts were valued at \$345 million, but the number of

contracts was just 26. In 2011, the number of contracts was 31, valued at \$568 million. By 2012 the number of contracts rose to 70, and they were valued at \$255 million. Similarly, if budget is divided into enterprise units, bargaining power cannot help being reduced. From the viewpoint of the company, if the volume is small, they cannot reduce the unit price due to fixed costs. Bundling similar enterprises is essential to increasing total budget. It will put Korea in a more favorable position to raise bargaining power. Israel is a good example of this case (KDAPA, 2012).

When Israel tried to purchase the F-35 in 2010, they expanded the economy of scale to raise their bargaining power. Lockheed Martin suggested providing 180 percent of the offsets rate to the Israeli defense industry enterprise, if the Israeli government agreed to adopting 20 of the F-35s. This case was criticized worldwide, even in the U.S., because this condition is rare in the world weapons market. But, on the condition that Israel adopt 20 of the F-35s, Lockheed Martin promised to give a \$4 billion consideration related to F-35 production to Israel's defense industry enterprises. Moreover, Lockheed Martin added one more option; they would give at least a \$1 billion consideration for the next 10 years. The price of the F-35 was \$2.75 billion. Including a nearly \$5 billion-dollar consideration, all these outcomes were a worthy accomplishment of the Israeli Department of Defense (KOTRA, 2012).

Like the Israeli case, a huge economy of scale forces foreign companies to provide tremendous offsets volume. This method is not restricted to many billions of dollars in the aviation industry. If the army or the navy combines several projects into one, they can greatly increase economies of scale, even if it is not as much as the Israeli example. Combined army / navy projects could be beneficial for both services. The foreign companies can reduce its effort, and the KDAPA could save time in making and managing each contract. Eventually, the KDAPA can save greater effort and a lot of paperwork.

C. TRANSFER / IMPLEMENTATION PHASE

In the transfer phase, the KDTAQ and the KDAPA have just received a report of results from the Korean companies. The Korean government concentrates on the offsets negotiation and then the government often loses interest in the offsets process. This is because the government thinks that the domestic enterprises have to manage the entire process after the contract has been awarded.

However, in reality, due to the limited capacity of South Korea's defense industry, there may be some problems associated with the quality, delivery of orders, and shipments. Therefore, foreign companies sometimes demand modifications to the contract or even cancellation of the contract. In contrast, from the transfer of technology perspective, foreign companies often make unnecessary technical modifications because of their reluctance to transfer technology. Recognizing these problems, the KDAPA needs to manage the export and technology issues thoroughly. The following sections describe some of the methods being implemented to address these issues (Baek & Lee, 2006).

When a tender is being advertised, foreign companies compete only for the winning bid. The purpose of a company is to make a profit. So, in order to be selected as the successful bidder may require the willingness to take a risk. However, the future of the company cannot be guaranteed. It is not possible to predict with any certainty that a company will not fail. After they are awarded contracts, companies want to maximize the benefit and greed can occur. As a result, they don't want to transfer their valuable technologies and try to reduce export volume.

The KDAPA needs to manage for exports by receiving the expected timeline from the foreign companies. The timeline is part of the offsets agreement considered in the detailed action plan and includes specific dates and percentage of execution. Foreign companies have to submit a feasible timeline, and when the companies do not follow the quarterly timeline that they suggested, the agreement can be terminated. Quarterly or yearly timelines can help the KDAPA to check on progress, and when there is a

difference of more than 5% in the timeline, the KDAPA should issue the first caution or warning.

The lack of timely progress can raise tension for companies involved in the contract. However, with a timeline checking system, the KDAPA can avoid having to punish foreign companies on the last day of the implementation of the contract, because the KDAPA can check on progress in real time before that time. In addition, it is necessary to give positive profit motivation to foreign companies in an appropriate way. For instance, when the specified level of technology transfer and export parts are achieved, the KDAPA can provide early payment to the seller of the weapon, before the scheduled payment date.

In addition to managing technology transfer by using a timeline, conducting a survey could be a solution to manage technology transfer. This is because it should be possible to identify the foreign companies that faithfully execute technology transfer. It is also possible to identify Korean companies that have the ability to receive technology transfer. Because of these reasons, after the end of the offsets, a survey should be carried out for beneficiaries and providers of technology. The survey needs to measure satisfaction of the domestic company and participation of the domestic company as seen by the foreign company.

A satisfaction survey is a questionnaire to investigate the level of satisfaction of domestic participants. In other words, it evaluates the level of satisfaction of the domestic company with the level of technology transfer targeting the foreign company. One important item of the satisfaction survey is the suitability of the environment for technology transfer. Adaptability to the environment can be classified into an internal environment and an external environment. The external environment items should include satisfaction questionnaires related to the support of government agencies. This should address whether human resources for offsets implementation management is working or has stable personnel. And the contents of the technical support agreement that the government signed with foreign manufacturers are also included in this survey. In addition, the survey must have some open-ended questions where respondents can write their responses and share their experiences. For example, the Korean government should

check whether there is a long lag time in the delivery of technology by the foreign government. If long lag time occurs, Korea needs to know the exact cost of damage resulting from the delay (Baek & Lee, 2006).

In the internal environment, the Korean government must evaluate whether Korean companies can transfer the technology of foreign companies without any help. If transfer of technology cannot take place because of the problem related to personnel as well as machinery or equipment problems, it should be described here. Furthermore, the government needs to verify whether the foreign company provided personnel and equipment maintenance support or training for technology. In addition, the survey should contain items that compare the technology transfer to the terms of the original contract. It is important to know whether technology was transferred as promised in the initial contract. Since foreign companies tend to transfer lower technology than they promised in the initial contract, it is necessary to confirm whether or not this occurred. Also, the suitability of the transfer method must be determined in the survey (Lee & Jung, 2009).

Participation surveys allow foreign manufacturers to assess the degree of a domestic company's participation. A participation survey is a questionnaire asking about the participation of the domestic company in each of the stages of technology transfer. And, this survey must examine how the foreign company evaluates how thoroughly the Korean companies understand the technology. Finally, it is necessary to include a question that checks the will of the Korean companies to use such technology in the future.

These survey results need to be improved. The survey results need to be designed to show the effect of motivation resulting from the incentive mechanisms. The purpose of the incentive system is to improve the quantitative and qualitative aspects of technology transfer. Incentives are targeted at both foreign and domestic companies. Positive incentives are applied to superior foreign companies that satisfy domestic companies. Positive incentives mean that outstanding foreign and domestic companies will get extra points in the next bid, while for domestic companies positive incentives mean earning a higher priority in technology transfer. This method offers expanded opportunities for both domestic and foreign companies selected as excellent companies in offsets. The outcome

is that domestic companies consistently selected as excellent can acquire more technology at less cost (Jung & Lee, 2009).

A measure to solve the avoidance of core technology transfer problems is efficient use of defense attachés. Developed countries avoid transferring technology to maintain their dominant market position. From the Korea's point of view, the problem is that Korea cannot always recognize whether foreign companies are willing to transfer technology. It also has occurred when the KDAPA failed to specify exactly what contents would be transferred at the stage of negotiation and agreement. Korea needs to enhance its resource gathering capabilities for defense attaché and defense cooperation officers in order to overcome such problems. Then, Korea should build a system to share information among defense attachés. Experts in international contract negotiations and technology are also necessary at the stage of negotiation and agreement. Information regarding the institutional obligations that may force foreign companies to select a particular technique also should be provided to Korea. See Appendix I for additional discussion of use of attachés.

However, a more fundamental measure is the one that allows the technologically developed countries to decide that transferring the appropriate technology will result in significant revenue. New technology follows the path of decline over time after its development because of the life cycle of technology (development of technology → effort for commercialization → commercialization start → growth → matured technology → decline of technology) (Kim, 2001). Therefore, before proceeding too far, Korea needs to persuade developed countries to jointly develop and co-produce by using each other's strengths to the benefit of all.

Korean negotiators' limit of expertise is connected to the KDAPA personnel policy. According to the KDAPA personnel policy, employees must move every two or three years to limit their power. Thus, the opportunity for professional experience is quite limited and opportunities for education in systematic negotiations are not provided. On the other hand, foreign company personnel who face Koreans across the table in offsets negotiation typically have been in charge of offsets for many years and are highly skilled negotiators.

Therefore, to solve such a problem, the personnel system should be established that can train experts and develop experienced negotiators and offsets managers over a long period of time and full careers. A systematic curriculum for specialists in negotiation needs to be established and the opportunity to experience the negotiation career in a similar location should be institutionally guaranteed. In addition, experts in international contract negotiation must be included in the negotiation team configuration. Korea can invite private experts as required, and of course, retired experts are among the backup resources. If there is a strong person needed for a particular negotiation, he should be able to be hired as a contractor any time.

D. UTILIZATION PHASE

The use of technologies that are obtained through offsets is a complex subject. The reason is that regulations make it difficult to apply a technology to a new process in industry for other than for the original purpose. Therefore, depending on the availability of foreign technology from offsets is risky. Partly because the Korean defense industry tightly controls technologies from developed countries indefinitely, it may not be possible to develop weapons systems with technology only available in Korea. Therefore, through the offsets process, it is necessary to concentrate on gaining information about other possible emerging technologies and early design concepts. Using technology obtained through offsets and based on the export volume, Korea must grow the capacity of its defense industry (Hu, 2003).

Korea still cannot ignore offsets technology because it was previously licensed to the Korean government through offsets. The KDATQ-owned technology that was acquired through licensing would be hard to give without charging a fee. Therefore, several criteria for government support may be needed. First, offsets are contract actions, so due to the financial benefit of export contracts, the government as a public institution is reluctant to help particular companies with their contractual obligations. To meet the policy objective of export expansion of the defense industry with government support, the KDAPA should reflect the benefit principle in its communications so that the public understands the government's rationale for the payment of a fee. That is, it supports

offsets for the purpose of implementing the policy for increasing competitiveness particularly for defense industry exports.

During the utilization phase, we recommend the activation of a surplus and selection material sale system (see Appendix II) because it can take advantage of technology obtained in the offsets so far.

When taking into account the special nature of the defense industry, there are costs for losing the opportunity to take advantage of the assets of government in other departments. This is because the government uses the government assets for helping specific companies. When the KDAPA clarifies standards for setting fees, the government can support offsets easily.

To take advantage of technology, orders are needed from domestic as well as foreign countries so that production can be possible to take advantage of technology. For example, there is little chance to produce the parts after a large project, such as a submarine or a fighter aircraft, is complete. That is, after the large scale project is finished, the environment in which firms can take advantage of the technology will be diminished or even disappear. The KDAPA should build a strategic partnership with foreign companies in order to ensure the revenue stream of a long-term project. In aircraft parts manufacturing, despite the fact that Korean manufacturers produced the parts in the absence of quality assurance by the partner country government, it has been impossible to export these parts. Therefore, strategic alliances with foreign companies are essential. Typically, foreign companies rank higher in the export area than Korean defense companies. Korea has to catch up to the developed countries as soon as possible (Kim, 2006a).

E. DIFFUSION PHASE

The diffusion phase focuses on how to use military technology to develop the private sector by using offsets. There is nothing better than technology obtained through offsets that is spread to the civilian sector, and it improves the competitiveness of the country. However, it is not easy to do so in the real world, as mentioned before. The offsets can be a measure of success when defense industry companies and private

companies export the parts obtained by the offsets process. Increased exports result in increasing defense industry-related jobs. To achieve this goal, the information of other countries' weapons is very significant. Military weapons are different from civilian goods. In order to export the Korean weapons systems, the KDAPA needs to pursue acquiring information and relationships with possible export countries. In addition, the KDAPA has to enhance the marketing that can be part of diffusion, because the Korean companies' image would increase when reputable foreign defense companies sell their weapons containing or supported by Korean parts.

Offsets diffusion does not mean only technology diffusion. Job creation also can be seen as a diffusion step when companies perform co-production. If the defense industry hires civilians for producing the weapons parts, job creation spreads to the private sector. From a larger point of view, job creation is part of the diffusion and as important as the spread of technology. Major countries that perform offsets use the offsets to increase export which automatically increases jobs. In 2012, for example, Peru decided to import the KT-1 trainer aircraft from South Korea. To expand job creation through offsets, Peru requested that the Korean government build a petrochemical complex center in their country. The United Arab Emirates also adopted an offsets policy to create new jobs at home. Through offsets negotiation with Korea to import light attack aircraft in 2010, they suggested a joint venture with Korea for job creation (KIET, 2013).

Korean offsets policy has focused on "technology acquisition," so the export industry and job creation has been sluggish. The amount of technology acquisition during the past 30 years (1983–2012) was about \$7.6 billion, accounting for about 48% of the total offsets. On the other hand, the proportion of exported parts that led to the creation of employment and the development of the parts industry was only 31%. The KDAPA considers "core technology acquisition" a key priority when they negotiate offsets contents, but many arms importing countries do not require a core technology because of a high level of uncertainty. Rather, these countries have focused on job creation, defense industry development, and export industry development, because the results are clearly measurable (KDAPA, 2012).

The volume of Korea's imports would be at least \$6.3 billion, including the next fighter and tanker aircraft over the next five years (2013–2017). When the KDAPA procures these future weapons, they must focus on job creation, not just technology. It is estimated that if the focus is on job creation, Korean employment domestically and abroad would grow by a maximum 30,000 jobs (KDAPA, 2012). Such job creation is possible through the transformation of institutional policy at little extra cost. It would be a huge advantage to the Korean government because it can reduce its effort and receive positive results. Moreover, both unemployment and government budgetary constraints can be solved directly, so the job growth would be meaningful.

To achieve these goals, the KDAPA should focus on exports, not technology, during the offsets approval process. As previously noted, the current export portion is 31% and the technology portion is 48%. When the KDAPA concentrates on exports, the export proportion within offsets value would increase to 60% and the technology portion would be decreased. It is estimated that Korea can employ 3% of the currently unemployed through offsets-related job creation (KIET, 2013). The KDAPA should increase the offsets priority of job creation that is not included now by adding and giving award points to foreign companies in the bidding process. The value of technology is uncertain, so its rating must be downgraded. Also, the fighter maintenance must upgrade the priority of offsets because it has the potential to create so many jobs.

For job creation through the expansion of exports, offset systems need to be revised to give exports a higher priority. First of all, if the Korean defense industry export contract is made because of a foreign supplier's own marketing activities, the equivalent amount should be acknowledged as the value of offsets. In other words, Korea should utilize foreign companies as an external export marketing support organization, if the Korean government can induce them to do so. Foreign companies which usually contract with Korea have global marketing networks and market intelligence in the global defense market. If Korea can engage the export marketing of superior foreign companies, then the Korean defense exports could be expected to be considerably increased. In the case of other countries like Greece, Norway, Taiwan, Sweden, Switzerland, Slovakia, and the UK, they already have similar policies. For example, Swedish Svenska Aeroplan AB

(SAAB) had no experience in selling generation-4 fighter jets, but SAAB sold Gripen jet fighters to South Africa with the support of the marketing of the British Aerospace Systems (BAE) (Defense, 2007).

Currently, the KDAPA has no marketing strategy for foreign companies. The KDAPA should make a prioritized list of items, then register and share the list with foreign companies. To do this, the KDAPA should consider export competitiveness, export license of these items from each of the Korean vendors. When the foreign companies include the KDAPA recommended items, they gain an advantage when they bid.

In the terms of offsets value acknowledgement, the Korean government should exclude items that they can export themselves without any help from foreign companies. To do this, the KDAPA would have to require foreign companies to submit an “items list” to the KDAPA before launching the export. Also, it is essential to acknowledge the items list only after the Korean government’s approval. The KDAPA should receive an export marketing plan from foreign manufacturers. After that, the KDAPA proceeds with the evaluation of the possibility of exports and the rationality of the marketing plan. When foreign companies submit the plan to the KDAPA, they must include the following: list of marketing items: target nation, target export amount, target export time, possibility of export success, and a request for the Korean Government or Korean companies that produce the item requested. The KDAPA can decide, and use the advice of KOTRA, KDATQ, and Korean defense industry companies if necessary.

Recognition of the value of offsets should be the same amount as the actual export contract amount. The level of contribution of the KDAPA and Korean companies during the contract should also be considered. The KDAPA needs to consider comprehensively when they decide the magnitude of offsets value and weight to a foreign company. At this time, as a rule, the foreign supplier's marketing costs should be considered last. The priority is recognized only in the case that the domestic export was successful and generated value in the domestic market. However, the domestic manufacturers’ entry into exports has been difficult up to now, but if it becomes implemented, the value of the exports will be taken into account. Also, Korea takes into consideration if the export of

major Korean items has been achieved and this is reflected in the point score. The point system should be reflected in the offsets guidelines.

The Order for Enforcement of the Act should be amended to make foreign companies keep long-term marketing. This is because it is difficult for the defense industry to succeed in the short term. Therefore, KDAPA's entry into contracts with foreign companies is very limited. To solve this problem, inducing foreign companies to undertake full-time export marketing support activities is required. Relevant provisions that can apply this system in offsets are necessary (SMI, 2012).

V. SUMMARY AND CONCLUSIONS

This study presented a new model for achieving the development of the defense industry and the development of a national defense science and technology industry, which is the fundamental purpose of offsets. Also, this report analyzed the problems of the current offsets system and different approaches to those challenges. The fundamental problem is limited technology transfer from foreign companies. To protect their own countries' interests, developed countries do not want to transfer significant technology. Furthermore, determining the monetary value of this technology is difficult. By recognizing these problems, this study has presented approaches to obtain sustained benefits through offsets. The new offsets model being proposed consists of several phases.

In the identification phase, it is determined whether the focus is on export or technology. When the possibility of acquiring technology transfer is low, the offsets percentage would be 0%. When the focus is equally divided between technology and exports, offsets would focus on co-production. When export quantity is high, offsets would only focus on export parts.

At the acquisition phase, this report explained how to get more buying power, using specific advantages. Specifically, the economies of scale and flexibility of time are major factors for gaining more buying power. The goal of offsets is to obtain as much technology or exports as possible from foreign companies.

In the implementation phase, this project has tried to offer management approaches useful to Korean government agencies. The KDAPA can manage negotiation advantage using a time line. When foreign manufacturers want to contract with Korean companies, the KDAPA has to receive a timeline of the transfer of technology from foreign companies.

At the utilization phase, this project suggests a strategy for expansion of co-production in order to overcome the limit of technology usage of developed countries. Also, an activation of a surplus and selection material sale system is recommended because it can take advantage of technology obtained in the offsets so far.

In addition, when the KDATQ use the technology that has been acquired from licensing, the Korean companies need to pay a fee for its use. At the diffusion phase, diffusion can be seen from at least two viewpoints. One view considers the spread of the technology, and the other view considers the rate of increase of employment. For the first viewpoint, it is very hard to spread technology to civilian companies because of the many restrictions from foreign companies. However, from the viewpoint of employment, this project report proposes co-production of weapons systems through offsets. The KDAPA should focus on job creation in the private sector by increasing co-production. It is related to marketing, so the KDAPA has to change its marketing strategy to work together with well-known foreign companies. Finally, Korea needs to consider the expansion of the dispatch of defense cooperation officers and military attachés to maximize exports, because better information gathering would contribute significantly to export weapon systems.

This study suggests that the major direction of the offsets policy of Korea should be converted to export from technology acquisition. By restructuring the defense industry, this proposed model will change significantly in the implementation, utilization, and diffusion phases, and eventually help Korea position itself higher in arms exporter rankings.

APPENDIX A. DISPATCH OF MILITARY ATTACHÉS AND DEFENSE COOPERATION OFFICERS

Korea needs to consider the expansion of the dispatch of defense cooperation officers and military attachés to maximize the export of defense industry by using offsets, because obtaining information is necessary to exporting weapons systems. Competition in the international defense industry market is becoming more and more intense. As a result, the effort to obtain information is essential to survive in this market. The mission of information acquisition for the defense industrial exports is primarily provided by Korean military officers assigned to the embassies in foreign countries or in other foreign assignments—persons such as the defense industrial cooperation officer. Currently, in 2013, Korea detaches military attachés to five countries (a total of 14 people, 10 of which are in the United States) and defense industry cooperation officers in two regions. In the case of the defense industry in developed countries, Korea has sent 20 to 30 people to 10 to 20 countries. Korea needs to dispatch more personnel to more countries. In particular, the number of personnel in the U.S needs to be adjusted while expanding the whole number of military attachés (KDAPA, 2013).

The KDAPA should dispatch defense industrial cooperation officers into three areas (Asia, Russia/CIS, and the Middle East) which have not been yet been assigned any of these officers. Currently, defense industrial cooperation officers have been dispatched per region. However, they should be divided per country in this field based on characteristics. The level of culture, development, and military power of countries are different. Thus, to obtain the export information per local region is undesirable. In order to enable the activation of gathering defense industry information, the KDAPA should increase the number of dispatched personnel among the defense industrial cooperation officers, and dispatch personnel not per region rather than per nation. Also, it is important to find unexplored countries through military attachés and defense industrial cooperation officers in order to expand export selection and surplus ammunitions sales. A defense industrial cooperation officer who would be dispatched to Latin America is a good example for pioneering a market successfully (KDAPA, 2013).

The additional dispatch of military attachés and defense industrial cooperation officers to NATO and EU countries as well as developing countries is also necessary. It is a fact that there is a difference in ability and defense science between the EU or NATO countries and Korea. In addition, for Korea, developing an EU export market is difficult, because the EU forms an economic community itself. For this reason, it is necessary to start the dispatch of additional military attaché and defense cooperation officers as soon as possible. The KDAPA should analyze trends and monitor the EU to sell defense industry export products in the future (Lee & Lee, 2009).

APPENDIX B. ACTIVATION OF SURPLUS AND SELECTED MATERIEL SALES

This project's intention is to suggest a strategy for expansion of co-production in order to overcome the limit of technology transfer by developed countries. Korea can take advantage of technology formally through co-production. The Korean government should avoid acquisition of detailed technology through offsets as much as possible. Instead, the KDAPA needs to promote medium and long-term export strategies to ensure policies such as joint development and co-production of weapons systems. Many countries around the world tend to prefer joint development and co-production of weapons systems to achieve budget reduction and foster the joint use of technology. The development of the JSF, F-35 aircraft, by the U.S. is a good example. Not only the U.S. but nine other countries, such as Italy and the UK, have participated in the development of the JSF.

Joint production, through offsets, is a very useful program for joint development and production of weapons systems. In the case of Korea, they contracted with Lockheed Martin Corporation for offsets when the Republic of Korea Air Force bought F-16 fighters during the 1990s. As a result, Korea was able to co-produce the T-50 advanced training airplane and now exports the T-50 to other countries. The utilization of technology acquired through offsets can be increased by the use of co-production. The KDAPA should consider co-production as a top priority when they proceed with large-scale weapons system development programs. Then, the Korean government can reduce the weapons system development budget and increase the level of utilization of technology. Also, it is possible to secure key technologies related to the development in the form of a package. As a result, Korea can create a major defense export product such as a T-50 again (Jang, 2012).

For Korea, an expansion of the current surplus and selected materiel sale system to include more than just ammunition is a good idea that can take advantage of technology obtained in the offsets. Old equipment culled in Korea can still be a useful weapons system that can protect the security of developing countries. If Korea succeeds

in exporting old equipment to developing countries, even if sold at low cost, it would provide an advantage by expanding the export market. Also, to ensure export opportunities for weapons systems in the future, selling surplus equipment to developing countries could be an advantage by generating revenue and opening supplier-customer relationships that may be beneficial in the future.

Through the Worldwide Warehouse Redistribution Services system for Foreign Military Sales member countries, the United States re-distributes surplus equipment. In addition, the Defense Reutilization and Marketing Service operates the United States Department of Defense surplus property sales program. For enhancing friendship with other countries, the United States exports military weapons at a low price, and sometimes delivers at no charge. Surplus United States military supplies from 2000 to 2005 were \$8 billion, based the original price of the equipment. In the UK, there is a dealer of surplus equipment called the Trade & Investment Defense & Security Organization. Israel has an Excess Inventory Sales Division (EISD) in the Foreign Defense Assistance & Defense Export of the Israel Ministry of Defense. EISD is in charge of arrangements and direct foreign sales of repair parts and warfighting systems for the defense industry and government (Kim, 2006b).

For the United States government, exportation plays the role of a lubricant for smooth diplomacy with recipient countries. For the U.S. military, they can dispose of the old equipment which is no longer useful due to the introduction of new equipment. At the same time, recipient countries can acquire equipment at a low price, so this policy is mutually beneficial. The KMD enacted laws and regulations, beginning on May 1, 2008, that may provide outdated equipment to other countries for free or at low prices (KMD, 2008).

Currently, the KMD is promoting business that transfers surplus munitions to the Philippines, Pakistan, Peru, and Cambodia. Thus, through the provision of surplus and other selected equipment, it is possible to justify foreign aid and reduce the administrative burden of old military equipment. In addition, these plans can be a basis for market expansion of the defense industry and military exchanges supporting the Korean national interest. Therefore, when the KDAPA or KMD establishes an export professional

organization, it is necessary to specifically include the sale of surplus materials, such as in Israel and the UK. The mission of this new organization is determining the life cycle of a weapons system, to handle the surplus components and selected weapons systems. It is necessary to ensure conditions that focus on purchasing and selling of surplus military materials aggressively. The influence of Korea in the worldwide defense weapons system market is still weak. However, overseas demand for used Korean weapons system has occurred gradually. It would be appropriate to consider a proposal to open an Internet site for the distribution of surplus products to the countries which use exports from the Korean defense industry as long as there is an approval process to review international sales. Additionally, some foreign sales of military equipment come with restrictions on further sales of that equipment without agreement of the originating country.

Korea needs to supplement and amend the “established rule on the overseas transfer of useless munitions,” which was enacted in May 2008 to include the export of second-hand munitions. In other words, the rule should be modified to sell not only munitions but also used equipment and weapons to overseas countries. KMD also must continuously update the status of the equipment of the army. Thus, it is necessary to address the decision-making or system as to whether or not it is possible to meet the restrictions by the originating country related to resale of the materiel. With those control procedures in place, Korea will be able to more freely export materiel that Korean forces no longer need. Now, foreign currency earned by the export of surplus munitions has basically been returned to the national treasury. Thus, even if the export of equipment is carried out, revenue, of course, must be returned to the national treasury. However, the export of equipment used by the Korea military also leads to the introduction of new weapons systems to materiel that has been disposed of and that could become a burden on the defense budget. Therefore, foreign currency earned by the export of equipment should be returned to the defense budget in the system as reimbursement to fund the purchase of replacement materiel. Additionally, profit earned by the export of munitions should be returned to the defense budget to support export of national defense ammunitions instead of being returned to the national treasury (Lee, 2009).

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